IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of:

Samuel D. HARKNESS, IV et al

Serial No.: 09/781,978

Filing Date: February 14, 2001

For: POST-DEPOSITION ANNEALED RECORDING MEDIA AND METHOD OF MANUFACTURING THE SAME

Examiner: Bernard D. Pianalto

Group Art Unit: 1762

DECLARATION UNDER 37 CFR 1.131

Commissioner for Patents
Washington, D.C. 20231

Sir:

Samuel D. Harkness, IV, declares under penalty of perjury under the laws of the United States of America as follows:

(1) I have received a Ph.D. in Materials Science and Engineering in 1995 from the University of Florida, Gainesville, Florida 32611. I am now a Senior Engineering Manager of Thin Film Technology Group, Advanced Magnetics, Media Technology and Recording Media Operations of Seagate Technology Holdings ("Seagate"), where I entered employment in 1998. My group performs advanced technology development (ATD) in support of future magnetic recording disk products. My groups' efforts can be primarily characterized as thin film sputter development encompassing endeavors in processing, novel materials, and magnetic schematic design. Prior to becoming manager in 1999, I served as a Thin Film Engineer in the same group. My background prior to Seagate includes assignments in thin film deposition equipment

development and implementation at Intevac, and laser deposition of novel transducer materials during a Carnegie Mellon University post-doctoral fellowship.

(2) I am familiar with the subject matter and claims of the present application. I am also familiar with the teachings of U.S. Patent 6,117,282 (Kuo) cited by the Examiner in the Actions of September 5 and October 11, 2002.

(3) I reviewed the Examiner's rejection and it seems that the Examiner is not convinced that the prior art does not teach from *in-situ* heating. The issue now is to clarify to the Examiner that Kuo does *not* teach *in-situ* heating. The following evidence form Kuo *itself* clarifies that Kuo does ***not*** teach *in-situ* heating:

Evidence 1: Kuo teaches measuring the magnetic properties of the Co-Tb film before and after annealing, which is clearly ***not*** *in-situ* annealing. Specifically Kuo teaches in column 6 lines 53 to column 7 line 1:

> The Co-Tb alloy with a composition of 38 at. % Tb was used as a target and the sputtering condition was the same as example 2. The substrate temperature was 25° C. After the Co-Tb film is deposited, a protective SiNx layer with thickness of 100 Å was produced on the film. The films were then annealed in a vacuum furnace for 60 minutes. The annealing temperature was varied from 100° C. to 250° C . The temperature was kept constant during the entire annealing period. The magnetic properties of the resulting films were determined. The M-H curves of the as-deposited $Co_{62}Tb_{38}$ film that deposited at the same sputtering conditions as example 2. The measuring applied fields were in both directions of parallel ($\parallel$) and normal ($\perp$) to the film plane. For this film, the in-plane coercivity ($Hc_{\parallel}$) is 1770 Oe and out-plane coercivity ($Hc_{\perp}$) is 4230 Oe. The Ms value of this film is 100 emu/cm^3. After this film is annealed in vacuum at 250° C. for 60 minutes, FIG. 4(b) shows the M-H curves of this annealed film.

Since Kuo also teaches using a VSM to measure the magnetic properties (See column 5 line 42-44) it is impossible to deposit the films, measure the magnetic properties with a VSM, anneal the films and measure the properties again with a VSM. The fact that there is a measurement step in between the deposition process and the annealing process means that it is

not in-situ. Moreover, a VSM is an independent measurement tool that would be at least impracticable if not impossible to incorporate into a thin film deposition tool coupled to a heater, as is well known in the art.

Evidence 2: Additional evidence that Kuo measures the magnetic properties of the film both before and after annealing are found in column 4 lines 6-16 wherein Kuo teaches:

> FIGS. 4A and 4B are diagrams illustrating the M-H loops measured along the directions of normal ($\perp$) and parallel ($\parallel$) to the film plane of $Co_{62}Tb_{38}$ film; (a) is the as deposited, the sputtering power is 40 W and the Ar pressure is 5 mTorr; (b) is the film after annealing in vacuum at 250° C. for 60 minutes.

(4) Typically, thin film deposition processes in a manufacturing environment must take into account throughput concerns. A typical thin film-processing tool, which processes one disc at a time, has a throughput of about 10 seconds per disk. Therefore, the real problem to solve is annealing these disks so achieve proper magnetic properties within the time constraints of the typical disk manufacturing process, which is annealing the disk within seconds. Kuo does not solve this problem whereas the Applicant does. Kuo discloses an annealing time of 60 minutes. A 60-minute anneal of Kuo amounts to 3600 seconds of annealing and that this is significantly higher than about a 15 second annealing time used in Applicant's examples.

(5) Additionally, annealing is much more involved than just heating a disk to a particular temperature. In particular, annealing involves increasing the temperature to a set point according to a specific ramp rate, allowing the disc to dwell at that temperature for specific dwell time and then decreasing the temperature back to ambient at a specific rate. It is impossible that a 3,600 second annealing time will have the same characteristics of about a 15 second annealing time.

(6) In conclusion, I declare that the Kuo patent's process is most certainly ***not*** done *in-situ*. Vacuum was used during annealing simply to avoid oxidation during the process of Kuo, and not as an *in-situ* continuation of the disk-making process.

I declare under penalty of perjury under the laws of the United States that the foregoing is true and correct. Executed at Fremont, California, United Stated of America, on January 10, 2003.

Samuel D. Harkness, IV